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<b>13. Abstract (Maximum 200 Words) (abstract should contain no proprietary or confidential information)</b> Two projects are being conducted under this funding award. The <u>cross-sectional survey</u> study (project #1) lays the ground work to establish a cohort of current Massachusetts Army National Guard (ARNG) members whose health status can be followed as they remain State-side; are deployed for combat, peacekeeping, or civilian emergency duties; and after they leave the military. The objectives are to: 1) describe the current health status of this ARNG cohort, 2) examine to what extent the job strain of ARNG service affects the relationship between civilian job strain and health and job performance outcomes and, 3) examine whether retention in the ARNG is related to current health status. The study cohort includes all current Massachusetts (MA) ARNG members and prior members who have left ARNG service within the past 3-4 years. A <u>prospective deployment health field study</u> (project #2) involving a MA ARNG group deploying to Bosnia in 2001 and a comparison group (non-deployed) is being carried out to examine cognitive readiness and potential changes in health related to deployment. These two research projects are currently in progress. They represent some of the first research projects to focus on the role that one's ARNG job plays on health status and quality of life.				
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## INTRODUCTION

Recently, epidemiological studies have demonstrated increased health symptomatology and lower functional status in troops returning from Gulf War (GW) in 1990-91 compared to other GW-era veterans (e.g., non-deployed personnel (Iowa Persian Gulf Study Group or Iowa et al., 1997; Haley et al., 1997; Fukuda et al., 1998; Unwin et al., 1999) or troops deployed to Germany during the same time period (Proctor et al., 1998; Proctor et al., 2001)). However, lack of information about GW veterans' pre-deployment health status has made it difficult to fully evaluate the role that deployment experiences play in soldiers' health (PRD5, 1998, p. 34). Two projects are being conducted under this funding award. The cross-sectional survey study (project #1) addresses three research objectives and lays the ground work to establish a cohort of current Massachusetts Army National Guard (MA ARNG) members whose health status can be followed longitudinally as they remain State-side; are deployed for combat, peacekeeping, or civilian emergency duties; and after they leave the military. The primary objective is to describe the current health status of this National Guard cohort using methods that will permit comparison to other population norms (e.g., Medical Outcomes Study Short Form Health Survey, SF36 (Ware 1994); SF36V (Kazis et al., 1999)) and current surveillance system parameters (e.g., US Army Health Risk Appraisal). The second objective is to examine to what extent the job strain (Karasek 1979; Karasek and Theorell, 1990) of National Guard service as a 'second job' affects the relationship between the job strain of the service members' civilian jobs and health and job performance outcomes (functional health status, fatigue symptomatology, job performance). The third objective is to examine whether retention in the National Guard is related to current health status by additionally surveying a cohort of persons who have left National Guard service within the past 3-4 years. The study cohort includes all current Massachusetts (MA) ARNG members and former members who have left ARNG service within the past three years (as of October 2000). Each participant is asked to complete a mail survey about his/her current health and deployment and occupational characteristics (both civilian and military). A prospective deployment health field study (project #2) involving a MA ARNG group deploying to Bosnia in 2001 and a comparison group (non-deployed) is being carried out to examine cognitive readiness and potential changes in health related to deployment. These two research studies are some of the first to focus exclusively on the role that one's Army National Guard job plays on health status and quality of life. Identification of specific occupational factors that relate either negatively or positively to health status is an important step towards designing and implementing effective strategies that will protect and improve the health of National Guard members in the current military environment (cf. PDR5, 1998; CDC Conference- Prevention Working Group Recommendations, 1999). Recent efforts in the area of deployment health and force health protection appear largely focused in the Active duty arena. As has been identified by the Institute of Medicine (2000), there is a need to focus research efforts on National Guard and Reserve forces in order to learn more about their specific issues and concerns in the current military climate.

## BODY

Two projects are being conducted under this funding award. The survey study (project #1) was initiated in January 2000 and the deployment health field study (project #2) was initiated in June 2001.

The progress made during this funding period (January 2002- January 2003) is described below for each task outlined in the approved Statements of Work (SOW) for each project.

## PROJECT #1. Health Status of Current National Guard Members: Role of Civilian and Military Jobs

The survey study was initiated in January 2000 and therefore a progress report for Year 1 and Year 2 of the funding award was reported in the previous Annual Reports.

[Summary of Year 1 SOW-shaded in gray]

### Approved SOW tasks for the funding period (Jan. 24, 2000- Jan. 23, 2001)

<b>Year 1</b>		
<b>Task 1</b>	Months 1-3	Hiring of project staff; Organize Advisory Group
<b>Task 2</b>	Months 4-10	Finalize the survey instrument, via:
<b>Task 2a</b>		Telephone and in-person interviews with current ARNG members
<b>Task 2b</b>		Conducting structured telephone interviews with ARNG members
<b>Task 2c</b>		Pilot the survey instrument on group of 20 volunteers.
<b>Task 2d</b>		Convene a meeting of the Advisory Group to finalize survey instrument
<b>Task 3</b>	Months 11& 12	Request updated list of current ARNG members from DMDC
<b>Task 4</b>	Months 11& 12	Determine number of persons who have left ARNG in past 3 years
<b>Task 5</b>	Months 11& 12	Pre-notification of study, at the unit level throughout MA
<b>Task 6</b>	Months 11& 12	Printing of final survey instrument and mailing materials

[Summary of Year 2 SOW-shaded in gray]

### Approved SOW tasks for the funding period (Jan. 24, 2001- Jan. 23, 2002)

<b>Year 2</b>		
<b>Task 1</b>	Months 1	First wave mailing to current ARNG members and group who have left
<b>Task 2</b>	Months 2 & 3	Three follow-up reminders, including one re-mailing of survey
<b>Task 3</b>	Months 1-4	Set up of data entry procedures
<b>Task 4</b>	Months 1-6	Data entry completed
<b>Task 5</b>	Months 6	Convene Advisory Group to discuss response rates and analytic plans
<b>Task 6</b>	Months 6-10	Data checking and cleaning completed
<b>Task 7</b>	Months 9 & 10	Initiate and carry out linkage to HRA database
<b>Task 8</b>	Months 11& 12	Preliminary data analyses and descriptive analyses

+ When the additional project (#2) was proposed and funded in June 2001, the funding award period was extended to 3 ½ years.

### Year 3 SOW

#### Approved SOW tasks for the funding period (Jan. 24, 2002- Jan. 23, 2003)

<b>Year 3</b>		
	Jan '02	
<b>Task 1</b>	Months 1-6	Re-initiation of survey plan (same format as proposed for year 2), but under new administrative procedures and with human subjects modification to include subject reimbursement plan.**
<b>Task 2</b>	Months 1-12	Carry out analytic plans to test study hypotheses.
<b>Task 3</b>	Months 7-9	Telephone interviews with subsample of survey non-responders ***
<b>Task 4</b>	Months 10-12	Analysis of telephone interview responses.
<b>Task 5</b>	Month 12	Convene Advisory Group to discuss results and manuscript preparation

\*\* The survey-mailing schema was initiated in Year 2 but not completed as scheduled in our original timeline as we requested to make some administrative procedural changes and needed to obtain IRB approval to include subject reimbursements. The BU IRB and HSRRB approved these changes in December 2001. The survey plan was re-initiated in early Year 3.

\*\*\* A request for supplemental funds was made and received in June 2002 to include telephone interviews with a subset of survey non-responders (revised SOW approved) and the project timetable for both project # 1 (and #2) was extended so that the end date for these projects is January 23, 2004.

To date, all tasks listed for Year 1 & 2 have been completed. And, all tasks in Year 3 have been initiated, some having been completed while others are in progress.

#### Year 3-Summary Status

**Task 1** Re-initiation of survey plan. [STATUS: COMPLETE]

**Task 2** Carry out analytic plans to test study hypotheses. [STATUS: IN PROGRESS]

**Task 3** Telephone interviews with subset of survey non-responders [STATUS: planned for April 2003]

**Task 4** Analysis of telephone interview responses. [STATUS: NOT INITIATED YET]

**Task 5** Convene Advisory Group. [STATUS: COMPLETE]

**Task 1** Re-initiation of survey plan, but under new administrative procedures and with human subjects modification to include subject reimbursement plan. [STATUS: COMPLETE]

With the IRB approvals, we moved forward and initiated the mail survey plan (using the local research group as the vendor for the printing, mailing, processing, and data entry procedures). The printing of all the survey and mailing materials proceeded in January 2002. We re-notified unit commanders about the study via a letter with enclosed flyers to post and public announcements about the survey study were publicized within the MA ARNG. The initial re-survey mailing started March 1, 2002. The re-mailing was sent to all persons in the identified cohort of 11,892 except for those who had completed the survey in our previous mailing wave last year (n=599\*), who had notified us that they were not interested in participating (n=16), or who we were informed were deceased (n=13). Thus, a total of 11,264\* persons were mailed the survey in this re-mailing phase. [\*NOTE: An additional 12 persons completed the mail survey in the prior wave, but they returned their survey to us in an anonymous way. As we had no way of telling who the anonymous responders were, the 2002 survey re-mailing included them.] As before, the initial mailing included a cover letter, letter of support from COL Zimelman (the MA ARNG State Surgeon), along with the survey and return envelope. Then, following the Dillman (1978) and Mangione (1998) methodology for mail surveys as we had planned, either a reminder letter or complete packet (with the survey) was mailed out at 2-3 week intervals. A final reminder letter was mailed on June 4th along with checklist form inquiring about whether the subject ever received the survey in prior mailings and about their reasons for not participating to date. The end date for receiving returned mail surveys was Oct. 1, 2002.

Over the complete mailing and survey collection period (between April 2001 and September 2002) a total of 1,970 completed surveys were returned for a 16.6-18.2% response rate, depending on the denominator used (either the total cohort pool of 11,892 or of those assumed to have received the mailings, 10,842). (Table 1).

**Table 1. Survey Response Categories**

Category Rates (first number is % of total; second number is % of those assumed to be located)

16.6%	18.2%	1,970 persons completed the survey (includes 12 anonymous)
8.8%		1,050 had mail returned as undeliverable, no forwarding address identified
0.3%	0.3%	37 reported as deceased
3.9%	4.2%	460 indicated they did not want to participate or were not available
70.4%	77.2%	8,375 categorized as non-responders (i.e. no contact)



The response rate to the mail survey (16.6-18.2%) is lower than we anticipated. So, we have taken additional steps to try and understand why this has occurred. Recent review of the literature (and personal communications with other survey study PIs) concerning mail survey response rates within current military personnel suggests that survey response rates are decreasing (US General Accounting Office, 2001), with response rates in the 15-40% range being observed (Schumm et al., 2000; Ryan, 2003 personal communication). [NOTE: Dr. Ryan is the PI of the Millennium Cohort Study (Chesbrough et al., 2002), a prospective survey study designed to follow a cohort of 140,000 military personnel over a 21-year period with re-surveying planned every 3 years over this time frame.]

From the final checklist forms that we received back following the final reminder letter (n=560), we were informed that a small group (2.5%) of these persons reported never getting a survey in the mail (even though we did not receive any notification back that the mail was undeliverable or that we had the incorrect address). The most prevalent reasons provided from the checklist responses by those 333 individuals who indicated that they did not want to participate in the survey study were the survey was too long and time consuming (30%). Some persons also expressed concern that the NG would see their responses (11%).

Although we will have sufficient power to test the study hypotheses with the current respondent sample size, we are aware that there may be differences between the survey respondents and non-respondents that may affect the validity and generalizability of the survey study results to the MA ARNG population. So, we have taken additional steps to examine the potential response bias.

Descriptive information about the larger group of current and former National Guard members from the DoD Defense Manpower Data Center (DMDC) was obtained at the study outset in order to identify our cohort. From these data, we find that the responders are significantly older (with the mean age=40.3 (SD=11.8) for responders and mean age=33.5 (SD=10.0) for non-responders). Also, responders are more likely to be female and officers (Table 2). After adjusting for age, comparisons between survey responders and those not responding indicate no significant differences in years since entry into the service, race/ethnicity, education, marital status, or whether ever served on Active Duty or been deployed overseas, although differences on race/ethnicity and marital status approach statistical significance. Also, no striking differences between occupational codes were noted between the responders and non-responders, except that those belonging in the Non-occupational category (students, trainees (bootcampers), officer candidates) were less likely to respond.

Similar descriptive differences between respondents and non-respondents have also been observed in other recent mail survey studies involving military personnel, such as the mail survey study conducted by Schumm and colleagues (2000) and recent analyses of the respondent characteristics of the 2001 cohort enrollment efforts in the Millennium Cohort Study (Ryan, 2003 presentation of current project status).

<b>TABLE 2.</b>	<b>NON-RESPONDERS</b>	<b>RESPONDERS</b>		
	<b>n=8,884 (does not include those whose mail was undeliverable, does include refusers &amp; deceased)</b>	<b>n=1958 (does not include 12 anonymous responders)</b>		
	<b>FREQUENCY (%)</b>	<b>FREQUENCY (%)</b>	<b>Age-ADJ. OR</b>	<b>95% CI</b>
<b>Gender</b>			<b>1.7</b>	<b>1.4, 1.9</b>
Male	7933 (89.3)	1718 (87.7)		
Female	951 (10.7)	240 (12.3)		

	FREQUENCY (%)	FREQUENCY (%)	ADJ. OR	ADJ OR 95% CI
<b>Race/Ethnicity</b>			0.85	0.72, 1.0
White	7753 (87.3)	1756 (89.7)		
Other	1131 (12.7)	202 (10.3)		
<b>High School Education</b>			1.2	0.96, 1.5
No	881 (9.9)	91 (4.6)		
Yes	8000 (90.0)	1867 (95.4)		
<b>Marital Status</b>			1.1	1.0, 1.3
Not Married	5682 (64.0)	868 (44.3)		
Married	3202 (36.0)	1090 (55.7)		
<b>Ever Served on Active Duty</b>			0.98	0.88, 1.1
No	6595 (74.2)	1374 (70.2)		
Yes	2289 (25.8)	584 (29.8)		
<b>Ever Deployed Overseas</b>			1.0	0.86, 1.2
No	7983 (89.9)	1746 (89.2)		
Yes	901 (10.1)	212 (10.8)		
<b>Rank</b>			<b>1.5</b>	<b>1.3, 1.7</b>
Enlisted	8186 (92.1)	1656 (84.6)		
Officer	698 (7.9)	302 (15.4)		
<b>Occupational Area - Enlisted</b>				
Infantry, Gun Crews, Seamanship	2100 (23.6)	441 (22.5)	1.1	0.95, 1.2
Electronic Equipment Repairers	182 (2.0)	49 (2.5)	1.2	0.85, 1.6
Communications and Intelligence Specialists	295 (3.3)	57 (2.9)	0.96	0.72, 1.3
Health Care Specialists	330 (3.7)	72 (3.7)	1.1	0.87, 1.5
Other Technical / Allied Specialists	239 (2.7)	65 (3.3)	1.2	0.90, 1.6
Functional Support / Administration	1030 (11.6)	290 (14.8)	1.1	0.92, 1.2
Electrical / Mechanical Equipment Repairers	899 (10.1)	197 (10.1)	<b>0.83</b>	<b>0.70, 0.99</b>
Craftworkers	368 (4.1)	92 (4.7)	1.22	0.96, 1.6
Service and Supply handlers	1162 (13.1)	228 (11.6)	0.93	0.79, 1.1
Non-Occupational	1581 (17.8)	165 (8.4)	0.83	0.69, 1.0
<b>Occupational Area - Officer</b>				
Not Defined	1 (0.0)	0 (0.0)	0.04	0.00, 3.99xE5
General Officers / Executives	2 (0.0)	0 (0.0)	0.02	0.00, 1.49xE3
Tactical Operations Officers	353 (4.0)	144 (7.4)	0.97	0.73, 1.3
Intelligence Officers	17 (0.2)	10 (0.5)	1.5	0.66, 3.3
Engineering / Maintenance Officers	69 (0.8)	35 (1.8)	1.1	0.69, 1.7
Scientists / Professionals	19 (0.2)	6 (0.3)	0.55	0.21, 1.4
Health Care Officers	45 (0.5)	35 (1.8)	<b>1.7</b>	<b>1.1, 2.7</b>
Administrators	66 (0.7)	30 (1.5)	0.92	0.58, 1.5
Supply, Procurement, Allied Officers	62 (0.7)	33 (1.7)	1.2	0.77, 1.9
Non-Occupational	58 (0.7)	7 (0.4)	<b>0.36</b>	<b>0.16, 0.81</b>

**Bold signifies  $p < 0.05$  as 95% confidence interval (95% CI) does not include 1.0.**



We are not able to ascertain from any DMDC-obtained variable fields if there are differential differences between the responders and non-responders in terms of health status and military/civilian job characteristics (other than occupational codes) that might impact the generalizability of the results obtained from testing the study hypotheses. We plan to examine this potential by conducting a telephone interview with a subset of non-responders (over sampled so that 50% of the subset will be less than 35 years old). See further description of this aspect below, under Task 3. Also, we have initiated a dialog with Dr. Ryan of the Millennium Cohort Study to ascertain the potential for a collaborative effort to compare respondent characteristics between the ARNG soldiers completing the Millennium Cohort Study and those MA ARNG soldiers participating in this study. Currently, the Millennium Cohort Study Scientific Advisory Group is in the process of developing guidelines for their collaborative efforts.

On November 1, 2002 we conducted the random selection (via SAS random number selection program) of survey participants to receive reimbursement. As planned, twenty study identification numbers were randomly selected for the \$250 reimbursements and ten were selected for the \$500 reimbursements. To date, we have contacted and sent reimbursement checks to 26 of these 30 individuals. We continue to contact the remaining 4 persons directly: we have been notified that they are currently deployed.

**Task 2** Carry out analytic plans to test study hypotheses. [STATUS: IN PROGRESS]

Eight hypotheses have been proposed for analyses in this study. We are in the process of addressing each of these hypotheses.

### **Study Hypotheses**

**Hypothesis #1:** Overall, the functional health status of current ARNG members will be similar to or better than other US healthy population norms, adjusted or stratified by age and gender.

**Hypothesis #2:** The Physical Functioning and Role-Physical subscales and the Physical Component Summary (PCS) from the SF36 will be significantly correlated to the health risk appraisal parameter, assessed within the past five years as part of the HRA, adjusted or stratified by age, gender and prior deployment.

**Hypothesis #3:** Increased job strain of one's military and civilian job is related to lower functional status and increased fatigue symptomatology.

**Hypothesis #4:** National Guard job strain characteristics (high job demands, low decision latitude or control) along with job insecurity, lower coworker and supervisor support, and a hazardous work environment will predict poorer military job performance.

**Hypothesis #5:** National Guard job strain will confound or modify the relationship between the effect of civilian job strain and adverse functional health status.

**Hypothesis #6:** Job strain of one's civilian and National Guard job will be highly correlated with increased frequency of occupational stress (as recorded on the HRA within the past five years). And, it is predicted that NG job strain will be more highly correlated with the HRA response than civilian job strain.

**Hypothesis #7:** Those ARNG members that have left the service within the past three years will have significantly lower functional health status compared to those who have remained in the service.

**Hypothesis #8:** Those persons in high strain NG jobs would be more likely to leave the ARNG.

We have created a master database that contains all the survey response data and are currently completing the necessary data cleaning, quality, and management stages, such as examination of item completion rates, scale reliability calculations, and potential differences in respondent characteristics and responses between those who completed the survey pre- and post-September 11, 2001.

The HRA data extraction procedures have been completed and these data are currently prepared for integration with the survey master database at the conclusion of the final data management steps pertaining to the survey dataset. When the integration is complete, we will proceed to carry out those analyses that specifically pertain to HRA-related variables (*Hypotheses #2 and 6*). A total of 89% of the survey responders provided specific consent for us to access their recent HRA data. The HRA data extraction procedure from the MA ARNG database was carried in October 2002. We obtained available HRA data (i.e., it existed) for 462/1738 or 25% of the survey responders. In December 2002, we initiated the separate request to LTC (P) Rubertone for any available HRA data that might be included in the national HRA database for any of survey responders who provided specific consent. From that extraction procedure, 147 of the 1758 participants matched. However, these 147 were participants had previously also matched in the MA ARNG HRA data extraction procedure, so we currently have HRA data from an earlier timepoint than those HRA data obtained in the MA ARNG database for these individuals.

**Table 3** presents the descriptive characteristics of the group overall and stratified by whether they are current or former MA ARNG members at the time they completed the survey. As might be expected, the group of former ARNG members is significantly older than the current members group. This observation is most likely related to the fact that former members have reached an age and/or cut-off number of years of service in order to retire from the ARNG. The group of former members is also less likely to have been an officer or deployed previously, and a significantly higher number of former ARNG members report to be in poor or fair (versus good, very good, or excellent) health compared to current ARNG members. There are no significant differences in education level, gender, race/ethnicity, and marital status between the current and former ARNG members completing the survey.

**TABLE 3. Descriptive characteristics of current and former MA ARNG members who returned survey.**

	All Subjects n=1,970	Current+ ARNG n=1,128	Former+ ARNG n=842	Significance
<b>Age, mean(SD)</b>	39.6 (11.8)	39.1 (11.0)	40.3 (12.7)	0.021*
<b>Education, mean(SD)</b>	14.1 (2.6)	14.1 (2.4)	14.1 (2.4)	Ns
<b>Gender</b>				
% Female	12.6	12.7	12.6	Ns
<b>Race</b>				
% White, Caucasian	82.6	81.8	83.6	Ns
<b>Marital Status</b>				
% Married	60.6	59.2	62.4	Ns
<b>Rank</b>				
Enlisted	32.6	27.8	39.0	0.000***
NCO	49.9	52.8	46.0	
Officer	17	19.1	14.0	
<b>Years of ARNG Service</b>				
< 5 Years	24.5	23.8	25.4	Ns
5 or more years	74.9	75.8	73.6	
<b>Deployment History</b>				
% Deployed Previously	27.9	31.6	22.8	0.000***
<b>General Health Rating</b>				
% Rating of Fair or Poor	5.9	4.3	8.1	0.000***

\* p < 0.05 \*\* p < 0.01 \*\*\* p < 0.001

+ Current and former ARNG status is based on status at time of survey completion (rather than when the cohort sample was selected, based on 2000 DMDC data).

As hypothesized, functional health status of ARNG members is better than US population, as the general US population norms for 35-44 year olds are 52.2 (SD=7.8) for PCS and 49.9 (SD=9.3) for MCS (Ware et al., 1994) (*Hypothesis #1*). Also, former ARNG members report significantly lower physical and mental functioning compared to those who are currently still in the MA ARNG (*Hypothesis #7*) (*Table 4*). Because former MA ARNG members were significantly older than current members, we reran the comparison of physical functioning scores adjusting for age. The differences between the groups remained significant.

**Table 4.** SF36V summary scores- Comparison between current and former MA ARNG members.

	ALL SUBJECTS	CURRENT ARNG	FORMER ARNG	Significance level
	MEAN (SD)	MEAN (SD)	MEAN (SD)	
<b>SF36V SCORES</b>				
PCS	52.8 (7.8)	53.4 (7.3)	51.9 (8.4)	***
MCS	53.2 (9.3)	53.7 (8.7)	52.5 (10.0)	***
PF	91.2 (18.0)	92.2 (17.5)	89.8 (18.6)	**

PCS= Physical Component Summary score from SF36V

MCS= Mental Component Summary score from SF36V

PF= Physical Functioning Subscale score from the SF36V

\* p < 0.05 \*\* p < 0.01 \*\*\* p < 0.001

Also, we have initiated preliminary analyses to examine whether increased job strain (determined by high job demands and/or low job control; Karasek, 1985) in one's military and civilian job is related to lower functional health status, increased fatigue symptomatology (*Hypothesis #3*) and poorer ARNG and civilian job performance (*Hypothesis #4*). Examination of the correlations between these independent and dependent variables (*Table 5*) suggests that ARNG job demands or degree of job control are not strongly correlated with worse physical functional health. However, more control experienced in one's ARNG job was significantly correlated with better mental functional health and lower fatigue levels. Increased ARNG job demands and less ARNG job control was significantly correlated with poorer ARNG job performance measures (e.g., missing work, injury on the job). Initial efforts to examine *Hypothesis #5* have been carried out and an abstract describing this work has been accepted for presentation at the upcoming Fifth Interdisciplinary Conference on Occupational Stress and Health Conference in March 2003 (Rosenman et al., 2003). In summary, civilian job strain was significantly associated with increased civilian job performance problems [regression coefficient =2.44 (SE=0.65), p<0.001], after adjusting for age, gender, education, marital status, rank, and civilian job satisfaction. However, participants with higher civilian job strain have more job performance problems with increasing amounts of ARNG job strain [regression coefficient for the ARNG/civilian job strain interaction variable=3.875 (SE=1.605), p=0.016]. In a separate model, ARNG job strain was significantly associated with increased ARNG job performance problems [regression coefficient =3.45 (SE=0.70), p<0.001], after adjusting for age, gender, education, marital status, rank, and ARNG job satisfaction, but there was no evidence of an interaction effect between ARNG and civilian job strain on ARNG job performance.

Continued multivariate analyses to fully address *Hypotheses #3, 4, 5, 7, and 8* are planned for Year 4.

**TABLE 5.** Correlation matrix (n=1,970).

	Age	Education	NG demands	NG control	Civ demands	Civ control	PCS	MCS	Fatigue	NG perform	Civ perform	NG A cope	NG P cope
Age	1	0.032	-0.035	0.259***	-0.088***	0.069**	-0.128***	0.156***	-0.108***	-0.126***	-0.149***	0.071	-0.110**
Education		1	0.005	0.095***	0.108***	0.247***	0.118***	0.107***	-0.122***	0.000	0.019	0.213***	-0.036
NG demands			1	0.216***	0.252***	0.066*	-0.022	-0.045	-0.007	0.143***	0.017	0.243***	-0.088*
NG control				1	0.052*	0.170***	0.038	0.219***	-0.258***	-0.180***	-0.124***	0.349***	-0.208***
Civ demands					1	0.122***	0.015	-0.087**	0.003	0.095***	0.136***	0.054	0.051
Civ control						1	0.049	0.128***	-0.167***	-0.008	-0.062*	0.142**	-0.036
PCS							1	0.014	-0.403***	-0.132***	-0.142***	0.080	-0.039
MCS								1	-0.681***	-0.188***	-0.268***	0.105*	-0.089*
Fatigue									1	0.236***	0.259***	-0.175**	0.060
NG perform										1	0.356***	-0.096*	0.102*
Civ perform											1	-0.091*	0.089*
NG A cope												1	0.001
NG P cope													1

NG demands= ARNG job demands, NG control= ARNG job control, Civ demands= civilian job demands, Civ control= civilian job control, PCS= Physical

Component Summary score from SF36V (higher number indicates better health), MCS= Mental Component Summary score from SF36V (higher number

indicates better health), Fatigue= summary score for Fatigue symptomatology, NG perform= ARNG job performance (higher number indicates worse

performance), Civ perform= civilian job performance (higher number indicates worse performance), NG A coping= degree of active coping used in response to

problems at ARNG job, NG P coping= degree of passive coping used in response to problems at ARNG job.

\* p < 0.05

\*\* p < 0.01

\*\*\* p < 0.001

**Task 3 Telephone interviews with subsample of survey non-responders [STATUS: IN PROGRESS]**

We plan to conduct a brief telephone interview with a subset of survey non-responders to ascertain whether or not they ever received the mailed survey and to evaluate whether there may be differences between survey responders and non-responders that may affect the validity and generalizability of the survey study results. Initial BU IRB approval for this amendment was granted October 2002. The Army Human Subjects Research Review Board (HSRRB) recommended revisions to the amendment in January 2003. Currently, both the BU IRB and Army HSRRB are reviewing the amendment and we anticipate receiving IRB approvals soon so that the interviews can be carried out in April 2003.

The purpose of the telephone interview study is twofold. First, we are interested in whether the survey non-responders remember receiving the mail survey that we mailed to them last year. Second, we are interested in conducting a short telephone interview that will include some questions from the original survey study to ascertain current health status and current civilian and ARNG job characteristics.

In the design of the telephone interview script, we include questions asking whether the person remembers receiving the mail survey to address the first item. If yes, we are interested in knowing why he/she did not want to participate in the mail survey and if the person answers no, we are interested in knowing if there are any special characteristics of these people that would explain why they didn't receive the mail survey (such as, whether they had been activated/deployed, recently moved, they lived in an apartment with a common mail bin for large envelope mailings). To address the second purpose of the telephone interview, we are asking only a set of questions from the original mail survey that focus on current health status and job characteristics. The rationale behind this second aim is that differences in health status and differences in current ARNG and/or civilian job characteristics between survey responders and non-responders may affect the interpretation of results (response bias) obtained in the analyses of the collected survey data in terms of our ability to generalize from the results obtained from the survey responders to the larger MA ARNG cohort.

The subject pool for the telephone interview will include those subjects who we believe received the mail survey but we are not sure ( $n=8,375$ ). The pool will not include those non-responding persons who we know never received the mail survey (i.e., the mailings came back as undeliverable upon repeat mailings to supposedly current addresses), those who indicated to us that they did not want to participate, and those who are deceased. To select the group to target for the telephone interview, we will stratify the subject pool by age, gender, and education level and oversample for subjects of younger age, so the subset of 500 subjects that we select to invite to participate in the telephone interview will be of similar proportion in terms of gender and education as the larger group from which they were sampled and oversample for the younger age group so that 50% will be less than 35 years of age.

It is planned that the brief interview will take 15-20 minutes and be carried out with a total of 250 persons. Trained interview staff from John Snow Institute (JSI) will conduct the telephone contact and interviews.

**Task 4 Analysis of telephone interview responses. [STATUS: NOT INITIATED YET]**

We anticipate completion of the analyses involving the telephone interview responses within 3 months of the completion of the interviews.

**Task 5 Convene Advisory Group to discuss results and manuscript preparation. [STATUS: COMPLETE]**

The annual Advisory Group meeting was held December 12, 2002. The primary purpose was to discuss the response rate issues, the degree of comparability of our respondent characteristics to the targeted cohort pool, and manuscript preparation plans. Given the current military climate and the importance in understanding the impact of ARNG job characteristics on health status, our Advisory Group colleagues encouraged us to publicize our research efforts by rapidly initiating manuscript preparations.

#### Summary of Year 3 Work Tasks for Project #1 (survey study)

At the end of this third year of funding, we have made progress on all the tasks set forth this year. Due to additional time needed to complete the survey and telephone interview with non-respondents, the grant period is extended until January 2004. For those issues that we have identified along the way as needing specific attention, we have taken specific actions (see below). We anticipate completion of all the SOW tasks at the conclusion of the grant period.

#### Specific actions taken:

- ◆ Efforts to understand survey response and generalizability of results.  
As described above, we have initiated several avenues to better understand persons' reasons for participating or not deciding to participate in this mail survey study and to address the generalizability of study results: checklist form sent with final study reminder, telephone interview with subset of non-responders, and initiation of potential collaboration with Dr. Ryan at the Millennium Cohort Study to compare results from MA ARNG responders to those ARNG soldiers who respond to the MCS.
- ◆ Continued publicity and communication with research subjects and ARNG personnel.
  - 1) The study website ([www.nationalguardstudy.org](http://www.nationalguardstudy.org)) has been created to provide a more efficient way to provide information to potential subjects about the two related ARNG research projects. Over this past year, we have added links to the Deployment Quarterly article published last summer and placed study newsletters on the site. The website also includes an email address for readers to utilize to request more study-related information ([info@nationalguardstudy.org](mailto:info@nationalguardstudy.org)).
  - 2) Throughout the year, the PI has periodically initiated email correspondence or met with the Adjutant General MG Keefe and COL Zimelman (MA ARNG State Surgeon) and other commanders to update them on the study's progression.
- ◆ Recognition of need for long-term health and wellness surveillance automated database systems within ARNG.  
Throughout the course of this study and especially this past year, the PI has been involved in conversations with several ARNG leaders about the nature of the current ARNG and total Army medical surveillance database systems, particularly in order to maintain and document medical readiness and longer-term chronic health issues within this military population. Several newer automated data systems exist (such as MEDPROS), but continued attention in the area is most needed to assess the capability and utility of these data systems to track prospective health issues pertaining to medical readiness.

#### **PROJECT #2. Health Status of Current National Guard Members: Deployment Health Issues**

In February 2001, it came to our attention that a group of MA ARNG members were due to be deployed to Bosnia in August/September 2001. We requested the opportunity to collect more extensive pre-deployment data regarding their health and cognitive functioning skills along with members of a comparison group that is not being deployed. (See further description in last year's Annual Report under Reportable Outcomes.) In summary, we submitted a request for supplemental funds to conduct a



prospective field study (pre- and post-deployment) with these ARNG members and a comparison group (request submitted 2/13/01). The request was approved with funding awarded June 2001.

The project has 3 primary objectives:

- 1) Characterize and descriptively analyze selected outcome variables concerning functional health, cognitive abilities (in terms of attention and concentration) as measured by computer-assisted tests from the Neurobehavioral Evaluation System, Inc. (NES3), and general well-being (such as the HRA risk index score, diastolic and systolic blood pressure that are collected as part of routine ARNG medical evaluations) in a group of MA ARNG before deployment and compare the results to those obtained from comparison group of MA ARNG members who are undergoing their routinely scheduled ARNG training exercises and/or medical examinations over the same time period (pre-deployment comparisons).
- 2) Compare differences in the various outcome variables over time within the Bosnia deployed group (e.g., pre-, during-, and post-deployment) and within the comparison group.
- 3) Contrast the differences over time between the Bosnia-deployed group and the non-deployed group.

An additional request and amended SOW was submitted in June 2001 to include a during-deployment assessment (with the support and assistance of MAJ Ness, US Army Medical Research Unit-Europe) and to additionally include selected cognitive tests from the Automated Neurocognitive Assessment Module (ANAM, Reeves et al., 2000) in order to validate in comparison to NES3 tests. The ANAM is a computer-assisted cognitive test battery that has been developed over the past 20 years within the military setting. This amended SOW was approved in July 2001. (BU IRB and HSRRB approvals for this project were made in July 2001.) Thus, the secondary objective of this study is to assess the feasibility and construct validity of administering selected ANAM tests in an operational environment.

The approved study protocol involves asking members from both the deployed and non-deployed comparison groups to participate in an interview to examine current health and ARNG job characteristics, complete a brief survey of concerning current health status, and perform a cognitive test battery (to examine attention and concentration abilities) with a combination of computer-assisted tests (i.e., NES3 and ANAM tests). For those participating subjects who are being deployed to Bosnia, they are being assessed pre-deployment, during-deployment, immediately post-deployment, and one-year post-deployment. The participants in the comparison group are being assessed at three timepoints within a time frame comparable to the deployed group's pre-deployment, post-deployment, and one-year post-deployment testing sessions.

Additionally, we have requested the participants' permission to review their medical, HRA and Army Physical Readiness Test (APRT) records so as to include some objective clinical measures of functional health (e.g., blood pressure, cholesterol, height, weight, and physical fitness levels). Also, we are requesting Armed Forces Qualification Test (AFQT) tests scores (for a measure of basic academic skills). Some of these data may be found in US Army or National Guard or DMDC databases. As we have found when carrying out the currently funded survey study, some of these data are currently collected by the ARNG, but not all are routinely entered or transferred into any type of existing state or national database (i.e., the information may remain as paper work in the subjects' medical record (such as vaccine records) or it may be discarded if there are no significant clinical indications for keeping it (such as HRA survey data for those persons less than 38 years of age)). For this project, along with the PI's currently funded survey study, we have made an agreement whereby the MA ARNG personnel will enter the HRA data for all persons completing this survey during the time period of the funded study. We are requesting access to those data for those persons who have provided specific consent for us to do so.

Five reliable and validated scales are being administered across all assessment phases: 1) Medical Outcomes Study (MOS) Short Form 12 (Ware et al., 1996), adapted for use in veterans (SF12V, Kazis et al., 1999), 2) MOS cognitive functioning scale (Stewart et al., 1992), 3) questions concerning ARNG job

demands (Karasek et al., 1985), 4) unit cohesion and leadership support scales (Marlowe, 1987), and 5) physical and mental fatigue symptomatology (Smets et al., 1995; Beurskens et al., 2000). We are also administering the Profile of Mood States (POMS, McNair et al., 1971) and the PTSD Checklist (Weathers et al., 1993).

The cognitive test battery consists of reliable and validated tests (presented to the subjects on a computer) that are part of the Neurobehavioral Evaluation System (NES) battery of tests (Letz, 1990, 1999; White et al., 1996; Proctor et al. 2000): Finger Tapping Test, Continuous Performance Test, Trail-Making Test, and the Digit-Symbol Substitution test, and a test to measure basic academic abilities (Wide Range Achievement Test (WRAT)-Reading (Jastek et al., 1984). We have also included the Test of Memory Malingering (TOMM, Tombaugh, 1996). Also, we have included several similar cognitive tests from the ANAM test battery (Reeves et al., 2000), such as the ANAM Continuous Performance Test and the ANAM Code Substitution Test (tests similar in functional domain being tested in the NES Continuous Performance Test and the NES Digit-Symbol Substitution Test) to assess the construct validity study of some of the ANAM tests. In the interviews with the Bosnia-deployed group, subjects are being asked to describe their anticipated hopes for the deployment (pre-), their deployment experience expectations and satisfaction (during-), and their opinions about how the deployment was for them (post-). In the non-deployed group, similar questions about their opinions and expectations about potential deployments have been included. The interview questions are drawn in large part from the work of Bartone and colleagues that examine Job Importance, Soldier Engagement, and Peacekeeper Identity (Britt et al., 2001; Bartone et al., 1996).

Subjects have been asked for their informed consent for participation in this prospective study (i.e., for the request to review their medical records and US Army database information and for the in-person interviews and testing procedures).

[Summary of Year 1 SOW-shaded in gray; Year 1 of project #2 was actually June 2001- June 2002]

#### Approved SOW tasks for deployment health study project (Year 1)\*

	01-start date	
<b>Task 1</b>	Month 1	Orient project staff to project tasks
<b>Task 2</b>	Months 2-7	Interview and test group of both MA ARNG deployed and control groups: pre-deployment Set-up subject tracking procedures
<b>Task 3</b>	Months 4-12	Plan and test group of Bosnia-deployed subjects during-deployment
<b>Task 4</b>	Months 8-12	Analyze collected data

\* When this funding award was initially made in June 2001, the timetable in terms of the award was altered to end July 2003.

Year 2 SOW; Year 2 of project #2 is actually July 2002-June 2003.

#### Approved SOW tasks for deployment health study project (Year 2)\*

<b>Task 1</b>	Months 1-4	Continue analyses and plan scheduling logistics for immediate post-deployment testing and interviewing.
<b>Task 2</b>	Months 5-8	Interview and test group of MA ARNG deployed and control groups: immediate post-deployment
<b>Task 3</b>	Months 5-12	Carry-out longitudinal data analyses (examining hypotheses)
<b>Task 4</b>	Months 11-12	Plan & conduct the 1-year post-deployment follow-up.

\*When a supplemental funding award was made in May/June 2002, the award timetable was revised to end January 2004 in order to complete the 1-year post-deployment follow-up testing and prospective

analyses. As the start date for this project does not coincide with the annual cycle date of project #1, the annual reporting on this project is off-cycle by 6 months.

To date, all tasks listed for Year 1 & the first half of the Year 2 SOW have been completed. The remainder of Year 2 SOW tasks is in progress.

#### Year 2-Summary Status

**Task 1&2.** Continue analyses and conduct immediate post-deployment and follow-up testing in both groups. [STATUS: Complete]

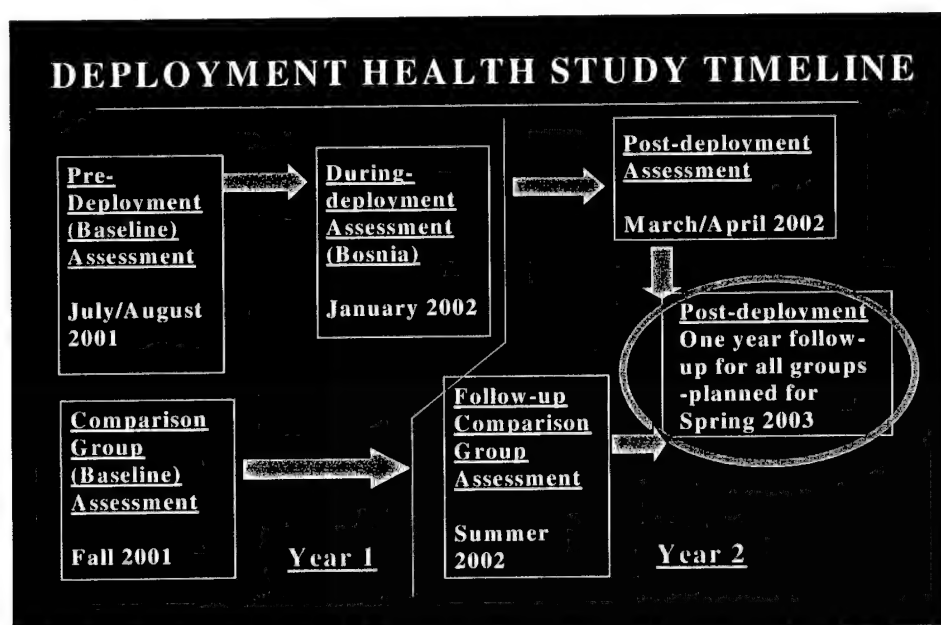
**Task 3.** Carryout longitudinal data analyses. [STATUS: In Progress]

**Task 4.** Plan & conduct the 1-year post-deployment follow-up. [STATUS: In Progress]

**Task 1&2.** Continue analyses and plan scheduling logistics for immediate post-deployment testing and interviewing. Interview and test group of MA ARNG deployed and control groups: immediate post-deployment [STATUS: Complete]

**Figure 2** presents the Deployment Health Study timeline. To date, we have completed the pre-deployment, baseline assessments with the deployed and comparison groups, the during-deployment assessment of the Bosnia-deployed group, and the immediate post-deployment, follow-up assessments with the deployed and comparison groups.

Figure 2.



A total of 171 Massachusetts ARNG soldiers are participating in this prospective study: 93 Bosnia-deployed and 78 non-Bosnia-deployed soldiers. (These numbers are somewhat different from those reported in last year's AR because assumed deployment status changed (i.e., several persons we thought were deployed did not actually deploy) and two people who initially consented and complete just the questionnaire at baseline decided not to continue.)

The immediate post-deployment assessment phase for the deployed group took place at Ft. Dix, NJ within their first ~5 days of return to the US in March and April 2002, approximately 8 months after their initial, pre-deployment assessment. (77/93 of the deployed group participated at the post-deployment phase or

83% response rate). The comparable follow-up assessment phase for the comparison group took place in the summer of 2002 (at respective armories or pre-arranged scheduling at local hotels) approximately 7-8 months after their initial, baseline assessment. (56/78 of the comparison group participated at the follow-up phase or 73% response rate). The overall response or follow-up rate was 78%. With these group sizes, we have sufficient power (at least 80%,  $\alpha=5$ ) to detect 3-7% differences on questionnaire-type scale scores and 5-10% differences in NES3 test performances between groups and over time. [NOTE: Clinical differences between groups are apparent when there are 15-25% differences in these outcomes.]

The majority of participants that we were not able to follow-up on during the post-deployment or follow-up testing was not accessible due to ARNG/military schedules. For example, several of the returning Bosnia-deployed participants did not return to the US within the same 3-week window as the rest of the group and thus weren't available for testing at Ft. Dix nor Massachusetts as they did not return ultimately to the Massachusetts area. At the time of the follow-up assessment with the comparison group (Summer 2002), a number of MA ARNG call-ups for deployments and homeland security missions were occurring. Thus, the majority of the comparison group participants that we were not able to follow-up with had either been deployed/activated or was away for training purposes. (In our next Report, we plan to provide an updated summary with the number of participants loss-to-follow-up over the course of the study and the associated reasons. One major challenge in conducting prospective studies with military personnel, especially in the current military climate, is that the identities of persons activated or deployed is classified information and thus cannot be released until the soldier returns from the deployment mission.)

Another issue that we are currently examining is the degree of comparability between our deployed study group and the larger group of ~225 MA ARNG soldiers who did deploy to Bosnia for SFOR10, as well as between the comparison study group and the larger pool of MA ARNG soldiers from same or similar unit types. With the survey study, we have collected information about the larger cohort of MA ARNG soldiers with which we can make some comparisons. Also, in early 2001, the PI initiated and carried out an anonymous, IRB-exempted study (under a separate study protocol) in collaboration with COL Zimelman (MA ARNG State Surgeon) to characterize the group of to-be-deployed Bosnia soldiers in terms of health status when they came in for their scheduled physical examinations. (In our next Report, we plan to provide a summary of these comparisons. Because the IRB-exempted study was anonymous, we are in the process of addressing IRB and HIPAA-related issues to examine the data to address comparisons between our study group and the other MA ARNG soldiers who did deploy to Bosnia.)

**Table 6. Descriptive characteristics of study groups.**

	Deployed group Comparison group			Participants completing initial testing protocol, minus the group from deployed unit with different role	
	(n=93)	(n=78)	p-value	Deployed group (n=69)	p-value
Age	29.1(8.5)	25.6 (8.4)	0.002	26.5(6.7)	ns
% less than 35 years old	75.3	84.6	ns	87.0	ns
% White, Caucasian	83.9	76.3	ns	85.5	ns
% Married	25.7	22.4	ns	14.5	ns
% College education	20.4	11.5	ns	13.0	ns
% Officer	17.2	3.8	0.006	10.1	ns

ns  $p < 0.05$

As was noted in last year's Report, the deployed group and the comparison group differ in some respects. The differences are largely accounted for by the one group within the deployed group (those from the headquarters-type unit) that tended to have older, more educated, and higher-ranking personnel. When we remove this subset and rerun the comparison analyses, the deployed group and comparison group do not differ significantly in terms of these descriptive characteristics (**Table 6**).

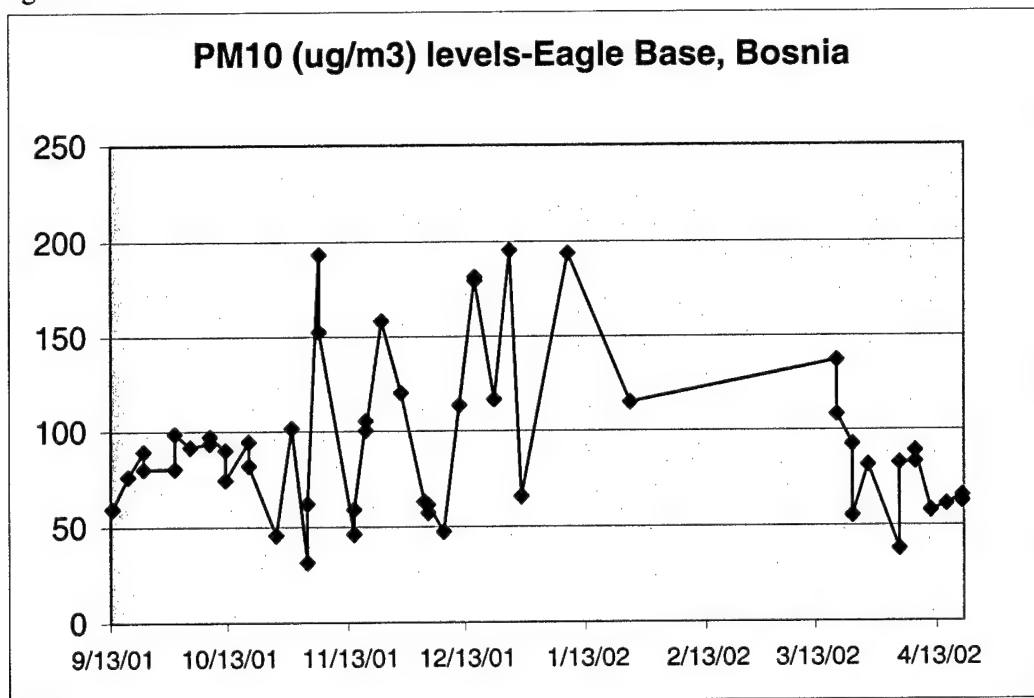
Ninety-two percent of the participants (157/171) provided consent to access their AFQT, APRT, and medical records (to document reported medical conditions). Of those persons, we have been able to obtain requested data (i.e., it exists) for approximately 70-82% of the group (**Table 7**). We were able to obtain HRA data for 57% of the group. The lower relative percent of available HRA data is most likely due to the two factors (noted in last year's Annual Report): 1) the MA ARNG does not maintain HRA data in their database for those soldiers less than 38 years of age even though it is routinely collected, and 2) State-level ARNG HRA was not routinely forwarded to the national HRA database. As noted above in survey study progress report, we made special arrangements during July 2000-October 2002 to have HRA data entered for the younger group. Also, the list of those persons from this study who consented us to access HRA data was sent to LTC(P) Rubertone to see if any matches were obtained in national HRA database. (Only 2 persons matched, but they were also matched in the MA ARNG HRA extraction.) Following the 1-year follow-up assessment planned for this year, we plan to collect recent information concerning recent APRT scores and medical conditions.

**Table 7. Rates of Data Types Obtained**

		% Obtained out of total study group (n=171)
AFQT	135/157 (86%)	79%
APRT	120/157 (76%)	70%
Medical Records	140/157 (89%)	82%
HRA	97/157 (62%)	57%

The PI has been aware that the US Army Center for Health Promotion and Preventive Medicine (CHPPM) has been conducting environmental monitoring in Bosnia through the course of US deployments there. In December 2001, the PI first spoke to Brad Hutchens at CHPPM about obtaining data on measured air particulate levels in Bosnia during SFOR10 (between October 2001- April 2002). In May 2002, he provided these point estimate data for PM10 levels (particulate matter <10 microns in size) for the Eagle Base area for this time period, as the group of MA ARNG deployed to Bosnia was based near or at Eagle Base while in Bosnia during their rotation. As noted in last year's annual report, the primary heat source in Bosnia is to burn coal and this generates a large degree of air particulates or soot, especially in the winter months. The maximum levels measured in the Eagle Base area ranged between 40-200 ug/m3 (or mcg/m3) over the 2001-2002 period, with the higher more variable levels being during the winter months (**Figure 3**). For comparison, the maximum 24-hour PM10 levels measured in Massachusetts normally range between 40-60 ug/m3 (MADEP 1999, [www.state.ma.us/dep/](http://www.state.ma.us/dep/)). Both the US National Ambient Air Quality Standard for the annual arithmetic mean for PM10 (50 mcg/m3) and 24-hour maximum (150 mcg/m3) were routinely exceeded in Bosnia. A recent report by Hastings et al. (2002) suggests a relationship between PM10 levels and upper respiratory disease rates in soldiers deployed to Bosnia in 1997-1998. Thus, on an exploratory level, we will also examine if particulate matter exposure is related to specific health outcomes in this group.

Figure 3.



**Task 3.** Carryout longitudinal data analyses. [STATUS: In Progress]

Two primary hypotheses have been proposed for analyses in this study. We are in the process of addresses each of these hypotheses.

#### Study Hypotheses

**Hypothesis #1:** We predict that baseline functional health status and cognitive functioning do not differ significantly between the Bosnia-deployed and comparison, non-deployed groups of ARNG soldiers.

**Hypothesis #2:** We predict that there will be fatigue-related differences in functional health status and cognitive functioning over time within Bosnia-deployed group, but no significant differences over time within comparison group.

Although there were some significant differences between the deployed and comparison groups at baseline (i.e., age and officer status) as discussed above, no other significant differences between these groups (**Hypothesis #1**) were noted in terms of functional health status, fatigue symptomatology, NES3 test performances, or for any of the summary descriptives in **Table 8**, with the exception of the MOS Cognitive Functioning Score which was significantly different between groups.

Initial efforts to examine aspects of **Hypothesis #2** (that is, whether deployment-related job characteristics are related to changes in functional health status or reported cognitive functioning) have been carried out and an abstract describing this work has been accepted for presentation at the upcoming Fifth Interdisciplinary Conference on Occupational Stress and Health Conference in March 2003 (Duttille et al., 2003). In summary, soldiers' physical functioning improved between the pre- and post-deployment assessments (pre-deployment=54.4 (4.8), post-deployment=55.6 (3.4); paired t-test= -2.1, p=0.04) for the 77 deployed soldiers who completed both pre- and post-deployment assessments. Soldiers' cognitive



functioning (CF) was worse over this time period (pre-deployment=87.2 (11.1), post-deployment=83.6 (16.7); paired t-test=1.9, p=0.06). Through hierarchical regression analyses that controlled for age, education level, rank, and pre-deployment functioning, deployment-related job strain changes were not found to be significantly associated with post-deployment physical health functioning. However, increased job strain over deployment was significantly associated with worse post-deployment CF (regression coefficient=-18.1 (SE=5.5), p=0.002). No significant group level differences in job strain or unit cohesion between three deployed units were noted. Within the deployed group over deployment, soldiers took significantly longer to respond to stimuli on the NES3 Continuous Performance Test (measure of sustained attention) with fewer errors, suggesting a strategic performance change. Analyses of the computer-assisted NES3 cognitive test performances over time in relationship to deployment-related factors and baseline risk characteristics within both the deployed and non-deployed groups are in progress.

**TABLE 8. Descriptive Characteristics of Study Group at Baseline.**

	Deployed Group (n=88) +	Comparison Group (n=70)
WRAT Reading score*	102.9 (9.4)	101.1 (8.6)
TOMM score *	48.7 (1.5)	48.1 (2.2)
Physical Comp. Score (SF12V)*	54.4 (4.5)	52.8 (6.4)
Mental Comp. Score (SF12V) *	54.9 (6.9)	52.6 (9.1)
Cognitive Functioning score (MOS)*	87.6 (11.4)	81.2(13.2)
Fatigue summary score (CIS)	50.4 (20.6)	55.2(20.5)
PTSD summary score (PCL)	26.3 (10.3)	27.1(10.1)
% Right-handed	91%	91%
% First language English	88%	89%
% History of prior deployment	23%	19%
% Head injury, with definitive loc	10%	3%
% No familiarity with computers	7%	4%
% No familiarity with video games	17%	19%

+ Participants who did all study parts at baseline: questionnaire, interview, and NES3 testing.

\* Higher score indicates better or higher levels of functioning.

The more appropriate statistical package for planned longitudinal analyses is SAS. Thus, we are currently in the process of transferring the SPSS datasets to SAS formats for continued analyses.

**Task 4. Plan & conduct the 1-year post-deployment follow-up. [STATUS: In Progress]**

The 1-year follow-up assessments with the study group are planned for April-June 2003.

**Summary of Year 2 Work Tasks for Project #2**

At the mid-point of this second year of funding, we have made progress on all the tasks set forth this year. Due to additional time needed to complete the analyses of the longitudinal data, the grant period is extended until January 2004. For those issues that we have identified along the way as needing specific attention, we have taken specific actions (see below). We anticipate completion of all the SOW tasks at the conclusion of the grant period.

Specific actions taken:

- ◆ Efforts to maintain communication with study participants for continued tracking efforts.
  - 1) Due to the importance of continued participant tracking efforts in a prospective study design, we have initiated newsletter mailings to update participants on study progress and to maintain current addresses. With the newsletter mailing, we have included a movie pass as a non-cash token gift.
  - 2) The number of recent ARNG call-ups for deployment and homeland security missions (i.e., > 33% of MA ARNG soldiers have been activated or deployed in the past year) and the classified nature of the identities of deployed/activated soldiers has required continued contact with MA ARNG headquarters and commanders to be kept aware of these changes to the extent possible.
- ◆ Efforts to address generalizability of results. Through efforts from another study undertaken under IRB-exempt status, we will be able to provide understanding for the comparability between those soldiers who have participated in this study and the group who did not and thus provide estimates of the generalizability of the study results. By design, the study results will be generalizable to ARNG soldiers on peacekeeping deployments, but not necessarily to combat missions.

## KEY RESEARCH ACCOMPLISHMENTS

During this funding period (Jan. 24, 2002- Jan. 23, 2003), we have completed most of the tasks set out in the Approved Statements of Work for both projects. It is anticipated that all tasks will be completed by the conclusion of the funding award.

### Project # 1-specific (the survey study) Research Accomplishments:

- Developed a comprehensive survey instrument to systematically query current and former ARNG members about their jobs and aspects of their jobs that might impact their health.
- Established a data management system to enable efficient integration of the collected survey data with the HRA data obtained from MA ARNG databases.
- Completed the mail survey data collection procedures.
- Initiated further collaborative efforts to address the generalizability of study results.

### Project # 2-specific (the deployment health study) research accomplishments:

- Established a cohort of Bosnia-deployed MA ARNG subjects for prospective study.
- Established a comparison group of non-deployed MA ARNG members for prospective study.
- Laid the groundwork to include and integrate other medical-type data records (HRA, medical records, AFQT, and APRT) into the dataset for analyses in this prospective study.
- Successfully integrated ANAM tests into the study protocol in order to conduct a validation study of selected ANAM tests in comparison to performance on comparable NES3 tests.
- Successfully tested the administration of ANAM tests on a hand-held computer device (ANAM Readiness Evaluation System, ARES) in the field.
- Successfully established and maintained a field study research team that is trained to conduct the study protocol in prospective field study settings with military personnel.

### Research accomplishments central to both projects:

- Establishment of a study website for more efficient communication to and from research subjects and other interested parties.
- Initiation of study newsletters to participants to update them on the progress of the study (also posted on the study web-site).

## REPORTABLE OUTCOMES

### 1. Manuscripts, Abstract, Presentations

- ❖ A summary article describing both of these ARNG projects was published recently on DeploymentLINK ([www.deploymentlink.osd.mil](http://www.deploymentlink.osd.mil)) and the Summer 2002 issue of the Deployment Quarterly.

- ❖ Several presentations have been made by the PI over this past year:

\*Proctor SP, Dutille KE, Rosenman ES, Ness J, Reeves DL. Computer-based assessment of cognitive abilities in a deployment health research study of US Army National Guard Members. Presented at the International Applied Military Workshop "From Computer-based Assessment to Augmented Cognition: Improving the Use of Computers from Selection to Operational Environment", hosted by the Austrian Ministry of Defense in Vienna, Austria, June 10, 2002.

\*Proctor SP. *Invited Speaker*- Examining the Occupational Health of Massachusetts Army National Guard Members. Presented at the Army National Guard program and the 108<sup>th</sup> Annual AMSUS (Association of Military Surgeons of the US) Meeting, November 13, 2002, Louisville, Kentucky.

\*Proctor SP. Health Status of Current National Guard Members: Deployment Health Issues. Presented at the AIBS Force Health Protection Review Program, February 25, 2003, San Diego, California.

- ❖ Two Abstracts have been accepted for presentation at the upcoming meeting.

\*Dutille KE, Rosenman ES, Pepper L, Proctor SP. Deployment-related job strain and health among Army National Guard members. To be presented at the Fifth Interdisciplinary Conference on Occupational Stress and Health conference-"Work, Stress and Health: New Challenges in a Changing Workplace" in Toronto, Ontario, Canada; March 22, 2003.

\*Rosenman ES, Dutille KE, Pepper L, Proctor SP. Civilian Job Strain and Performance in Army National Guard Members. To be presented at the Fifth Interdisciplinary Conference on Occupational Stress and Health conference-"Work, Stress and Health: New Challenges in a Changing Workplace" in Toronto, Ontario, Canada; March 21, 2003.

- ❖ Two manuscripts, one for each study, are currently in the planning stages.

### 2. Active Collaborations (in addition to MA ARNG collaborations)

- ❖ With MAJ Ness, CDR Dennis Reeves, and Dr. Timothy Elsmore who have working on the development and validation of the ANAM & ARES. As part of this collaboration we anticipate being able to provide anonymous ANAM and ARES test performance data to these collaborators for integration into their master database system (following IRB approvals).
- ❖ With Dr. Ryan of the Millennium Cohort Study, in order to examine generalizability of results.
- ❖ With Tom Mangione, PhD and JSI (for their survey methodology expertise).

### 3. Research training opportunities

Three Boston University School of Public Health students are currently working as Research Assistants on these projects. Two of them will be graduating with their MPH this May 2003.

#### 4. Funding applications based on work supported by this award

With Dr. Jennifer Vasterling (clinical neuropsychologist) from the New Orleans Veterans Affairs Medical Center, the PI has submitted and been awarded joint DoD and VA funding to carry out a prospective assessment of changes in neurocognition pre- and post- deployment in to-be-deployed (2003) Gulf and non-Gulf deployed military personnel (USAMRMC #DAMD17-03-2-0020; Prospective Assessment of Neurocognition in Future Gulf-Deployed and Gulf-Nondeployed Military Personnel: A Pilot Study. PI: Jennifer J. Vasterling, Ph.D.; Co-PI: Susan P. Proctor, D.Sc.). This new study follows a similar design and methodology to the PIs current study of Bosnia-deployed MA ARNG soldiers.

#### CONCLUSIONS

The work on these funded projects are on-going. When completed, they will provide important information about the health and well-being of ARNG forces in the current Army climate and will identify occupational factors that relate either negatively or positively to health status and/or job performance (including cognitive readiness) and that can lead to implementation of effective intervention strategies that will protect and improve the health of National Guard members in the current military environment.

Recent efforts in the area of deployment health and Force Health Protection appear largely focused in the Active duty arena. There is also a need to provide some focused effort on National Guard and Reserve forces and this research need has been identified by the Institute of Medicine (1999, 2000) and mentioned at the recent session concerning Force Health Protection at the Conference on Illnesses among Gulf War Veterans (January 2001). The Army National Guard operates under a somewhat different structure than the Active Duty Army: politically, bureaucratically, and socially. Thus, to be most beneficial in designing effective strategies in deployment health protection one needs to understand the nature of who and what make up the ARNG forces in this current climate, as well as the State and National frameworks in which they operate. The two projects being conducted under this funding award are some of the first to focus of the specific occupational health issues surrounding ARNG service and deployment health.

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